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THE

MICROSCOPICAL BULLETIN

and

SCIENCE NEWS.

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We call attention to a paper on "Dry Mounts," on page 17, kindly sent at our request by Miss M. A. Booth, of Longmeadow, Mass., whose excellent work is well known. A lot of objects recently sent us for selection showed much care and skill; among them a dry mount of scales of mosquito is the finest thing of the kind we have seen. Miss Booth prepares objects for sale, and also offers unmounted objects in considerable variety.

We do not send the BULLETIN free, except in some special cases. We try to make it well worth the small price asked, and think we succeed in doing so, if we can judge from what our subscribers say. To them we take this occasion to make our "best bow" and return thanks for their many kind words and wishes.

Oleomargarine.

On page 23 will be found a communication upon a subject of practical interest to all. The adulteration and sophistication of butter and other foods offers a wide and interesting field for profitable work to our scientific societies.

The Camden Microscopical Society is looked up to in that community and is regarded with a wholesome respect. So, elsewhere, scientific men individually, and especially as associated in societies, have a great influence in such matters, which, if fully exerted, would soon stop the masquerading of oleomargarine as butter and force it to be offered solely on its merits. One mode of such action which suggests itself would be to cause the publication of the simple chemical test referred to in the above-mentioned communication, in the local papers, as the "*U. S. Department of Agriculture Test,*" which would at once give it a certain reputation or standing.

Why Do Dry Mounts Fail?

BY M. A. BOOTH.

In looking over my collection of slides, procured both by purchase and exchange, and representing the work of European and American preparers, with a view to noting their keeping qualities, I have been so surprised at the number of failures as to query whether permanence in microscopical work is possible. Why is it that so large a proportion of dry mounts—the first for the beginner to essay and the simplest, the mere protecting the object from dust and moisture—fail? Obviously that motto which should emphatically be the microscopist's motto, "*Festina lente,*" is not heeded by all workers. The advances in the merely mechanical portions of mounting have evidently not kept pace with those in its purely scientific departments, or else microscopists sometimes forget to take counsel of their good common sense in the use of cements. In this collection are slides which have cost hours of skillful manipulation and yet are utterly ruined because of inattention to the details of the proper use of a cement. How do we sometimes apply balsam to a mount? By running it under the cover and trusting to capillary attraction to fill the field. But why should this law of capillary action be operative in the case of the balsam and suspended in that of the cement?

From careful observation and a not limited experience—I speak of dry mounts of diatoms and the like—I am convinced that success or failure depends not so much upon the kind of cement used as upon the care with which it is used.

In my own work, however, I have fixed upon white zinc as the most reliable cement, and I have sent out hundreds of slides made with this cement accompanied with the request

that all failures be returned, so that I might replace them with perfect slides; but not a slide has ever been returned. It has been my experience that white zinc properly prepared and properly used never fails. The secret of success with good white zinc is, that the rings shall be *thoroughly dry*—prepared at least forty-eight hours, and preferably more, before using. I am now making up my summer's supply of white zinc rings. It may be objected that so much drying consumes too much time. Slides can be ringed at the rate of a gross an hour—and this at odd moments when no other species of microscopical work is possible. These slides, packed in rack-boxes, occupy but little space, are free from dust, and reliable slides are always ready for immediate use. For striping, I use artists' colors ground in oil and mixed in dammar. If a narrow, white zinc ring is desired, a coat composed of copal varnish and Brown's rubber cement preserves the oil-colors and gives firmness to the ring without adding to its apparent width.

In deep cells for opaque mounts, I do not find those slides whose cells contain an aperture any more free from dewy deposits upon the cover than those which are hermetically sealed. The following described cell I have found very satisfactory in my own use. Use no volatile substance within the cell; paste a dead black paper upon a white (not much glazed, and therefore absorbent) one, and from this cut with a gun-punch disks of the desired size; centre a slide and paste a disk upon it—black side down, to exclude the light; upon this cement with gold-size a brass curtain-ring—flattened or not, according to the depth of the cell required; run on a background with any shade of water-color paint which best exhibits the object, leaving a white margin around the edge of the cell; cement the cover with a small quantity of white zinc to the ring; color the cell as may be desired; run on the copal mixture already described, giving added security to the cover and rounding out the cell. This makes a neat and durable mount, and no dewy deposits have ever, to my knowledge, appeared upon the covers of cells so made.

With regard to the prevention of "dewing" in transparent mounts, I may add that I have found it essential that the objects should be *thoroughly dry*. If diatoms, use the covers direct from the brass mounting-table; or if such as have been breathed upon, as scales, see that the moisture is fully evaporated, and in sealing use the smallest quantity of cement consistent with a perfect adhesion of the cover-glass.

[CONCLUDED.]

The Examination of Objectives.

By Ernst Gundlach.

C. The angle of aperture must be ascertained by actual measurement. The enlargement of the angle of aperture of any one objective may be effected by merely enlarging the diameters of the several lenses composing it, while retaining their curvatures. But with this enlargement all aberrations and their disturbing effects increase in a triplicate ratio to the aperture. The larger angle of aperture is consequently of value only in case the aberrations have been corrected in corresponding ratio and in a higher degree, so that the disturbing influences thereof are not greater than in an objective with a smaller angle of aperture. But as the aberrations in the objective of smaller apertures have been corrected, as far as this can be done by means of form of the flint glass lenses, the increased aberration of the enlarged aperture can only be decreased by correcting a part of the aberrations in the *pure* way, by thickening the front lens, instead of correspondingly forming the flint glass lenses, and as upon the former depends the working distance, *D*, the latter is conditioned by the angle of aperture and higher correction of the aberrations required in consequence.

Perfect centering, *E*, shows itself in this way, that the growing indistinctness of the outlines and indistinct expansion of the image, when the latter is moved out of the focus, take place all together equally over the whole surface, and appear quite concentric. If, under these circumstances, phenomena of a sideward displacement appear, the centering of the lenses is imperfect.

The power of an objective to transmit light, *F*, is not dependent merely on the size of the angle of aperture, but also on the number of refracting surfaces and the clearness and polish of the lenses—the fewer surfaces the greater the power of transmitting light.

Whether the lenses are clear and well polished can be easily ascertained by looking with a good magnifier (the focus of which is a little longer than the distance of the rear lens from the rear end of the setting) through the rear end of the objective, turning the front end toward the light. Thus, all the surfaces can be brought easily into the focus of the magnifier in succession, and the smallest particle of dust resting on them can be seen.

The resolving power of an objective does not depend exclusively on the size of its angle of aperture, but just as much on the degree of correction of the aberrations, especially those of the higher order.

The enlargement of the angle of aperture would entirely fail to accomplish its aim—that is, to increase the resolving power—if the degree of the corrections of the aberrations were not heightened at the same time and in the same proportion. The best means to attain this latter purpose consists, however, in the thickening of the front lens and consequent shortening of the working distance, as I have clearly demonstrated in my theoretical description of my new condenser.

The short working distance of an objective of the highest resolving power is by no means a condition of the size of its angle of aperture, as is often believed to be the case, for with equal sized angles of aperture a great difference in the working distance is possible. The best cor-

rection of the aberrations essential to attain the highest results demands short working distance.

It follows, from the above, that with a dry objective the maximum performance requires the minimum of working distance. The immersion system is nothing more than a substitute for the extreme thickness of the front lens, formed by a corresponding stratum of water, to gain with the highest possible performance a tolerable working distance. * * * —*Am. Jour. of Mic.*

The Working Session.

By Albert McCalla, Ph. D.

In a former communication I presented some reasons for regarding the working session as a very important part of the meetings of our national society, and for hoping that it may be given a full and prominent place in the future meetings. It may not be amiss to add some further thoughts in its favor.

First, then, the working session is one in which all the members of the society can meet on common ground. It is true they seem to stand in two distinct classes, experts and learners—but this is only an apparent and temporary distinction. All are together students of microscopic technique, comparing with and communicating to each other the advances they have made, the methods they have tested, and those they wish to learn. Workers each in different fields, the subjects of their study are often so diverse that members of such a society sometimes feel but little interest in the results of each other's investigations, or only that general interest which they have in all discovery. The diatomist cares but little for the minutiæ of the nerve termini in the lungs, the practical physician, perhaps, votes the carefully written paper on the resolvability of diamond-ruled lines a bore, and the mineralogist gives attention to the botanist's discussion of the evolution of the laticiferous tissue of the dandelion chiefly out of courtesy. But each one is deeply interested in the methods of work by which such results were obtained, and is anxious to learn all the latest discoveries in technique, all the niceties of preparation of the objects and manipulation of instruments, that he may turn them to account in his own work. Each microscopist is, or ought to be, able to verify his tools, able to test and calibrate—so to speak—his objectives and other apparatus, to measure accurately their aperture, amplification, and the accuracy of their corrections. Each one wishes to learn the practical details of any promising method of preparation, mounting, or examination of objects—and all this can be but learned by actual observation of how acknowledged experts do it.

Again, it should be remembered that while some are so fortunate as to live in large cities and enjoy the benefits of strong local societies, where all the latest results of the optician's art and the manipulator's skill are soon set forth, a large number, remote from great cities and from wealthy institutions, can only read of such discoveries. When they meet each other once a year in the sessions of the A. S. M., they wish, therefore, not only to hear papers read and discussed, but to see the preparations described, to examine the slides on which the published statements are based, and to study the details of objects and methods they have read of, but never have seen, and so to test their own work by that of others.

But it will be said—and has been said—the soiree affords opportunity for such work as this, or it can be left to private seances in the intervals of the regular sessions. This is a great mistake. The soiree is chiefly to entertain the general public, and has grown to such vast proportions that there is left in it no charm for quiet, careful examination of any special object. The members must each stand guard over their own instrument as a matter of safety for its proper handling, as well as of courtesy to explain the objects shown, so that they have little or no chance themselves of seeing each other's exhibits. The special working sessions for exhibition of methods, and the short sessions for examination of objects referred to in papers, first introduced at the Chicago meeting, are, it seems to me, but a most natural "evolution" of the soiree of earlier meetings. That became specialized into the soiree proper, the working session, and those special hours for examination. To lump these all together once more, as has been proposed, would be a step in retrogradation, and one which I have little fear the society will ever take. Its tendency would be rather to more complete specialization—the introduction of new features without the sacrifice of old ones. There should be full time for the reading and discussion of papers of general interest—though many should be read only by title, and others in brief abstract only, as has often been done in the past—but at least one-half hour each day should be set apart for the study of preparations referred to in papers, and one-half day should be given for the presentation of methods of work. Visible, tangible demonstration of everything discussed ought to become more and more the rule, and the use of projection lanterns and ordinary and class microscopes to illustrate statements made in papers or discussions ought to be far more general than it has ever yet been.

A New Stain from the Huckleberry.

By Albert E. Jenkins, Ann Arbor, Mich.

In Volume XXIII of the *Archiv für Mikroskopishe Anatomie*, Dr. Lardowsky describes a new stain, which he highly recommends for the karyokinetic figures and the cellulose walls of plants.

The fresh ripe fruit of the huckleberry, *Vaccinium myrtillus*, is washed in water, and the juice expressed and mixed with twice its volume of distilled water, to which a trace of alcohol has been added. It is then boiled, and filtered while hot, the resulting fluid being of a clear

deep-red color and faintly acid reaction. This, if kept in a cool place, will remain unchanged for a considerable time. Probably a crystal of thymol or of chloral hydrate would prolong the period. At the time of using, it is diluted with two or three volumes of distilled water, as it is quite thick when cold.

This solution stains red all objects hardened in chromic acid or chromium solutions. A beautiful violet stain, which is also more permanent than the red, may be produced as follows: The section is stained for one or two minutes as usual in the red fluid, then washed in distilled water and transferred to a one per cent. aqueous solution of lead acetate. Here it is watched until the red has changed to a lilac, when the specimen may be at once mounted in glycerine, or transferred through alcohol or clove oil to balsam.

Selected Notes.

Siliceous Membrane with Properties of the Cell-wall.*—A. Famintzin has constructed artificially, by the action of concentrated hydrochloric acid on soda-glass, an excessively thin perfectly transparent siliceous membrane having many of the properties of the cell-wall and of starch-grains. These membranes allow osmotic currents to pass freely through them, and their reactions with fuchsin and carmine solution are the same as those of vegetable membrane; the former they absorb eagerly with very deep staining, while toward the latter they are perfectly indifferent. They also swell up in water to the extent of about five per cent.; and this must therefore be regarded, not as a special property of organized structures, but rather as one belonging to all colloidal bodies.—*Jour. R. M. S.*

New Instance of Symbiosis.†—C. di Marchesetti describes a case of symbiosis between an alga and a sponge from the Gulf of Singapore, the compound organism having been described by Hauk as an alga under the name of *Marchesettia spongioides*. He regards the sponge (*Reniera fibulata*) here as the parasite which, from its delicate structure and the absence of any cartilaginous or calcareous framework, has, for the sake of protection, attached itself to a red alga with stout stem. The close union of the two individuals has completely altered the structure of the alga, so that it resembles another sponge of the genus *Chalina;* and Marchesetti thinks we may possibly have here an instance of protective mimicry.—*Jour. R. M. S.*

Diatomaceous Deposits in Scotland.‡—Professor W. T. Macadam records the discovery in Scotland of larger diatomaceous deposits than any yet found. The deposit at Black Moss, Aberdeenshire, contains over eight hundred thousand cubic yards; those of Ordie and Kinnord at least an equal quantity. That at Gress, Lewis, occupies a basin-shape cavity not many feet above sea-level, and said to be more than twelve feet deep. The Glen Shira deposit is, however, likely to prove the largest. The material is generally found forming a bottom layer or stratum underlying peat. Analyses of the various deposits are appended.—*Jour. R. M. S.*

Remarkable Development of Aspergillus niger.*—J. B. Schnetzler records the remarkable development of *Aspergillus niger* in water in which there had been a fragment of mucus† from the stomach of a mad dog. The fluid contained pepsine, and possessed all the properties of gastric juice; it dissolved, for example, small morsels of albumen. Nevertheless, the fungus developed a very abundant mycelium; the protoplasm was not attacked by the pepsine, a fresh proof of the fact that a pronounced difference must exist of a chemical nature between living protoplasm and ordinary albumen.—*Jour. R. M. S.*

(from the German.)

Observation by Artificial Illumination.

By Dr. J. W. Behrens.

The microscope is an apparatus of the day. The best source of light for it is diffused daylight, when the heavens are evenly covered with a transparent white veil of clouds. The blue of the cloudless heavens, the changing light of hurrying clouds, and the direct sunlight are alike objectionable for careful microscopical investigations. But if one has necessary microscopical work to do on a sunny, cloudless day, his best course is to take a white wall or a large white paper screen, which reflects sunlight, as the source of his illumination.

But it will now and then happen to the microscopist that he *must* work by the light of the lamp, it may be to make the evening hours help out the short, dark, winter days, or it may be to study the reproductive processes in the lower cryptogams, which take place only during the night hours. In these cases one has to contrive some way to improve the artificial light, which in and of itself is in the very highest degree unserviceable for microscopical observations. The yellow light of gas or petroleum consists, for the most part, of rays which belong to the first half of the spectrum, and are, more than any other, hurtful to the eyes of the observer. Besides, if one turns the mirror directly to the flame, the field of view is commonly too bright; and if toward the lamp-shade, it is too dark. In order conveniently to modify the brightness and color of the light, the following means is suggested and recommended: Direct the mirror to the brightest part of the flame, and then interpose, close to the mirror, an upright screen of thin, translucent paper,

* *Bull. Acad. Imp. Sci. St. Petersburg*, xxix (1884), pp. 414–6.
† *Marchesetti, Carlo di, "Suo un nuovo caso di Simbiosi."* See *Oester. Bot. Zeitschr.* xxxiv (1884), p. 337.
‡ *Mineral Mag.*, vi (1884), pp. 87–9.

* *Arch. Sci. Phys. et Nat.*, xii (1884), p. 419.
† (Mucous membrane?—Ed. Mic. Bull.)

which one can easily make in a few moments. This subdues the brightness of the field so much as to make it painless to the eyes. In order to change the yellow color to a blue tint it is only necessary to bring between the mirror and the diaphragm a little plate of blue cobalt glass. I use a little, round, glass disk, about 13 mm. in diameter and 2 mm. thick. Its color is a faint blue, and the under-side is slightly and uniformly ground. This little plate is placed directly under the diaphragm. In this way the illumination of the field is made uniform and soft bluish.—*The Microscope in Botany.*

The Ocular Micrometer.

[Whether it be divided into metric or English units is unimportant, except that it may sometimes be required for use as a stage micrometer, since the working value of the divisions depends upon the optical conditions under which they are used, and must be carefully determined after the apparatus is arranged and in order for the proposed work.

The simplest, cheapest, and commonest form of ocular micrometer is a round cover-glass, properly ruled, which is laid when about to be used upon the diaphragm of the ocular in the focus of the eye lens. The rulings should be turned downward to bring them close to the diaphragm, and if not distinctly visible they should be made so by slightly unscrewing the lens, and thus bringing them into its focus. * * Unless a screw be attached, as is sometimes done, giving a delicate lateral movement, the use of any ocular micrometer is much facilitated by the employment of the mechanical stage, by means of which a coincidence of certain lines with any part of the object to be measured can be the better secured. R. H. W.]

Measuring by means of the ocular micrometer is conducted in the following way. The micrometer is put in place, its scale and the object brought in focus, and then by turning the ocular and moving the object the whole length of the object to be measured is covered with the scale in such a way that its rulings are perpendicular to the longer axis of the object. Then adjust the object as sharply as possible and count up how many of the rulings are covered by it (whole and fractions). This number is to be noted down, and if one desires very great exactness the measurement may be repeated on different parts of the scale and the results averaged.

It is clear that one does not get the exact and real size of the object by this process. * * * The determination of the relative value of the ocular micrometer by means of the objective glass-micrometer is very simple. The latter is used as an object, and then it is determined how many of its divisions answer to a certain number of the divisions of the ocular micrometer. Divide the first by the last and the result will be the true value of the ocular micrometer divisions in units of the objective micrometer. If, for instance, twenty divisions of the ocular micrometer cover an extension of eighty-seven micromillimeters of the objective micrometer, the value of an interval in the ocular micrometer will be $\frac{87}{20} = 4.35\,\mu = 0.00435$ mm. [In such work round numbers are always preferred, for the sake of simplifying the labor of computation and comparison. In the above example, for instance, the twenty divisions of the ocular micrometer could, by lengthening the optical axis of the microscope by slightly raising the draw-tube, be made to cover one hundred micromillimeters instead of eighty-seven, the value of one interval becoming $5\,\mu$ instead of $4.35\,\mu$, and the labor of computation being reduced to almost nothing. So in the author's following illustration, the values 8, 3.63, 1.27, 0.55 would by a judicious use of the draw-tube be changed to 8, 4, 1.5 or even 2, 0.6 or even 1 respectively. Having once found a convenient position of the draw-tube for a certain purpose, much trouble will be saved by recording that position so that it can be promptly restored when next wanted. The draw-tube should be graduated for this purpose. Having been set in position approximately by means of the graduation, a slight readjustment will instantly secure exact apposition of the desired lines (say twenty to one hundred) of the ocular and objective scales. R. H. W.]—*The Microscope in Botany.*

In a letter received from Professor T. J. Burrill, referring to the use of his stain for tubercle bacillus as prepared by ourselves, he says:

"The stain is not deep enough in half an hour unless careful attention is paid to the temperature, keeping it at 100° Fahr. If the heat rises much above this, the material on cover is apt to become too much softened, and, what is worse, the staining fluid is destroyed to a greater or less extent.

"The stain (diluted in same way) is *an excellent one for vegetable sections, being remarkably selective* * in regard to the different tissues.

"The bottle of stain sent me has stood for ten months (since received) on my work table near a window and shows no deterioration."

Hibernation of Zygnemaceæ.†

G. Schaarschmidt has observed that the vegetative filaments of Zygnemaceæ (two species of *Mesocarpus* and one of *Spirogyra*) have the power of retaining their vitality through the winter. In the broken lumps of melting ice in a ditch toward the end of March, he detected pale, yellow, or colorless balls, the contents of the cells having shriveled up in an irregular manner, and the chlorophores almost lost their color, as well as their special spiral form in *Spirogyra* and disk-like form in *Mesocarpus*. In the Spirogyra-cells were to be seen a few len-

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* Italics ours.—Ed.

† *Magyar Növén Lapok*, viii (1884), pp. 33–7. See *Bot. Centralbl.*, xx (1884), p. 257.

ticular starch-grains in the chlorophores, as well as pyrenoids. When placed in a warm chamber, these cells showed signs of germination after the lapse of a few hours. In *Mesocarpus* the protoplasm rapidly increased and became attached to the cell-wall, the chlorophores assumed the form of a rounded square, and the lamellæ increased slightly in length. In *Spirogyra* the chlorophores assumed their characteristic form in the course of a few hours, but their color was lighter than the normal. *Cladophora glomerata* showed similar phenomena. It is probable that other algæ, including some of the filiform desmids, are able to hibernate in the same way.

Remarks on Using Oil-Immersion Objectives.

The following recommendations for the care and use of our one-fifteenth oil-immersion lens (a copy of which is sent out with each objective) will be found useful and generally applicable:

In using these objectives cleanliness is important. Only a small quantity of immersion fluid should be used, and it should be wiped off as soon as possible when done using, as, owing to its penetrating qualities, if left on for a long time it may gradually work in through the mounting, and by getting on the back surface of the front lens injure the performance.

To remove the oil, blotting-paper should be used, and then, breathing on the front lens wipe it lightly with a piece of clean soft linen.

For central light, a mixture of equal parts of fennel and castor oils should be used, and for histological specimens in general.

For oblique light, as with diatoms, use pure cedar oil.

In order to keep these fluids unchanged, they should not be exposed to the air nor to the light for any length of time, as exposure to the air will thicken them, and so alter the refractive index. Exposure to light will darken the color.

Other immersion fluids having a refractive index of 1.50 or 1.51 may also be used. A good mixture is composed of five parts of glycerine and one part of chloral hydrate.

The *best* results with oil-immersion objectives are obtained by the use of a condenser of very great aperture, even as high as 1.30 to 1.40 numerical aperture.

Instead of this, however, where oblique light is to be used, a small hemispherical lens answers very well. This should be cemented to the slide by a minute drop of oil or glycerine, and carefully centered to the object.

A Cheap and Efficient Life-Box.

By James E. Whitney, Rochester, N. Y.

It is often very desirable to use several life-boxes in the comparative examination of different "finds," but their expense has heretofore limited most observers to the use of one or two. The advantage of having quite an assortment of various sized boxes is apparent.

The writer has devised the following simple but efficient form of life-box, which is easily made and almost without expense—the entire cost per box not exceeding five cents.

Get from any hardware store a full set of brass ferrules, consisting of about a dozen ferrules of graduated sizes fitting snugly one inside the other. Take any two which fit well together and cement the smaller one, large end down, to the centre of an ordinary glass slide. Cement to the top of the ferrule one of the thickest cover-glasses you have that fits it. Now take another cover-glass which fits *inside* the larger ferrule, and cement it to the inside at the top. The box is now complete, and all that remains to be done is to slip the larger ferrule over the other. Mica can be used instead of the cover-glasses, if desired.—*Proc. A. S. M.*

Cheap Punches for Sheet Wax.

By James E. Whitney, Rochester, N. Y.

As wax remains one of the best materials for building up the walls of cells, it may be of interest to describe a plan by which any worker can make for himself a series of punches ranging in size from one-fourth inch up to one inch, at an entire expense of about ten cents for the set of a dozen punches

Get a set of brass ferrules, such as described in the account of the life-box, and with a round file bevel the large end to a cutting edge, which is easily done, and you will then have a set of punches of convenient size adapted to making wax rings of sizes corresponding to all the ordinary sizes of cover glasses.—*Proc. A. S. M.*

Items.

If one should ask for a section of "bone of whale," would whalebone fill the order?

A medical student once inquired of us in regard to binaural microscopes. Don't keep them.

The latest advices from German laboratories, says the *Canada Medical Record*, report no new bacilli this week.

A celebrated objective-maker advertises a $\frac{1}{6}$-inch homogeneous-immersion of 161° glass angle, equivalent to 1.50 numerical aperture; and a $\frac{1}{12}$-inch, with solid front, having num. ap. 1.47.

The American Association for the Advancement of Science will meet this year at Ann Arbor, Mich., on Wednesday, the 26th of August. The university buildings will afford suitable rooms for the meetings of the various sections.

The American Society of Microscopists will meet at Cleveland on Tuesday, the 18th of August, holding four days as usual. In another column will be found some remarks on the working session by ex-president McCalla. We anticipate an interesting meeting.

We have received a programme of the new *Monthly International Journal of Anatomy and Histology*, conducted by eminent professors in Germany, Sweden, London, Philadelphia, and elsewhere. Published by Th. Fischer, Dorotheenstr. 8, Berlin. Contributions are received in English, French, German, or Latin.

A. T. Fraser* suggests from observations in the extreme north of Scotland, where no forest trees can be got to grow, that leaves fall in autumn from trees growing above a certain latitude—about 30°—through loss of vitality in the more or less highly polarized light. "Where the light is polarized, trees are scarce or absent, mown by a swathing light; and in the tropics, where there is little polarization, they are luxuriant and green all the year round." Leaves fall everywhere, of course, but in the higher latitudes the fall is *en masse* in the autumn; while more south it is in continuous driblets only.—*Jour. R. M. S.*

New Publications.

The Microscope in Botany: A Guide for the Microscopical Investigation of Vegetable Substances. From the German of Dr. J. W. Behrens; translated and edited by Rev. A. B. Hervey, A. M., assisted by R. H. Ward, M. D., F. R. M. S. 466 pp., 13 plates, and 153 cuts. Boston, 1885.

This translation, just now ready, has been long looked for, and is an important work. Dr. Ward has revised the two chapters treating of the microscope and accessories, omitting "the illustrations and descriptions of apparatus in the continental style, which is comparatively unused and unavailable here," and substituting American forms. It is scarcely necessary to say that his work is well done, and displays an intimate acquaintance with the subject. It would of course be possible, were one so disposed, to make criticisms here and there; but the fact remains that the work is one that is creditable to author, translator, editors, and publishers. We regret that we have not space for a fuller notice; elsewhere, in the present and next number of the Bulletin, we propose to make brief extracts of some interesting matters.

Will be sent by mail on receipt of price, $5.00.

The Microtomist's Vade-Mecum: A Handbook of the Methods of Microscopic Anatomy. By Arthur Bolles Lee. 12mo, 424 pages. Philadelphia: 1885.

The working microscopist of a dozen years ago, if suddenly set down amidst the paraphernalia of the modern biological laboratory, would, we think, feel some concern when confronted by all the fluids bearing strange names, brilliant stains of which he never dreamed, elaborate microtomes, whose theoretical possibilities almost would excuse his exclamation "Too thin!" but whose practical results would eclipse his cherished ideals and revolutionize his notions of section-cutting. With all regard for what has been accomplished in the past, the fact remains, that he who would engage at the present in histological studies with the hope of successful issues must be thoroughly familiar with recent methods. To such workers, the book in question will be a companion duly appreciated. Here are grouped and discussed within one's reach ample directions for *all* the methods possessing any real value. Instead of weary search through files of foreign journals, a moment's glance supplies the practical hint on a doubtful process. We emphatically declare that the *Microtomist's Vade-mecum* is a book no working histologist can afford to be without.

Will be sent by mail on receipt of price, $3.00.

Bacterial Pathology: a series of papers on the exhibits at the biological laboratory of the Health Exhibition. Reprinted from the London *Lancet*, and illustrated with over thirty engravings, showing the appearance of the Bacteria and the apparatus used in preparing and cultivating them. New York, 1885; forty pages, paper cover.

A valuable little pamphlet, well illustrated. Will be mailed for twenty-five cents.

CORRESPONDENCE.

"Pure Creamery Butter."

Camden, N. J., 5th mo. 21st, '85.

Editor Microscopical Bulletin:—Some months ago the Microscopical Bulletin noticed the publication of a pamphlet by the Department of Agriculture, entitled "Analysis of Butter and Fats, by Thos. Taylor, M. D., Microscopist." Thinking it might be of interest, I sent for it at once, and must return thanks to the Bulletin for having put me on the track of this interesting matter.

Having secured the information from the pamphlet of how to detect the presence of adulterations in butter, the next thing was to prove the work to my own satisfaction. To find the characteristic result promised for pure butter, I vainly tried samples of "Pure Creamery Butter" from the first-class groceries of our city, but somehow I could not get the result promised—even, strange to say, they all

* *Nature*, xxxi (1885), pp. 388 and 482.

showed the unmistakable mark of admixture. It may be well here to quote the words of Mr. Taylor: "The test is a very simple one. If a few drops of sulphuric acid be combined with a small quantity of pure butter, the butter will assume first an opaque whitish yellow color, and after the lapse of about ten minutes it will change to a brick red. Oleomargarine made of beef fat, when treated in the same manner changes at first to a clear amber, and after a lapse of about twenty minutes to a deep crimson."

In order to satisfy myself, I was fortunate enough to secure some butter made under my own eye, by the old-fashioned method of beating pure cream in a bowl. With this as a prime prover, I obtained the promised result, both when fresh and after several days. (In fact, the rancidity from age did not in any way affect the test.) But, to my amazement, all the samples afterward showed clearly that some other fat was present; some were part butter, in which case the two fats separate themselves in the dish, the butter forming the centre, and the other fats forming a ring of dark crimson surrounding it, with a greenish cast if any preparation of lard enters in the mixture. The action of cotton-seed oil I am not able to state certainly, but believe it to have a peculiar granulation, which I intend to prove by mixture and test. There is a difficulty arises in examinations of this character which must be borne in mind by any one inclined to test his table butter, that it is almost impossible to buy butter after it becomes known that the test is being made, the buttersellers seeming to have a great lack of confidence in the test. It is the intention of Mr. De La Cour and myself to give a public exhibition of the tests before the Microscopical Society of Camden at an early meeting, and *invite samples* from dealers, but we have no fear of our powers being overtaxed by the number presented. The peculiar crystallization of the various fats in cooling is another easy method of detection, but a description thereof would be too lengthy for the time at my disposal.

530 *Penn Street.* JNO. B. BETTS.

(At our request, Mr. Taylor has kindly sent us a few copies of the paper above referred to, which is illustrated with colored plates; we shall be glad to distribute these to any of our subscribers who may be interested in the matter.—ED. MIC. BULLETIN.)

Wanted, a second-hand microscope stand monocular, with sub-stage (not necessarily a *swinging* sub-stage) moving in the optic axis; first-class coarse and fine adjustments; revolving or mechanical stage not necessary; a size smaller than the largest stand preferred: price must be low.

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